



System-Wide Water

SWWRP
 Resources Program

Habitat Based Ecological Response Models

Description: Improved forecasting using habitat and functional index models can be achieved by integrating the index models with (1) hydrodynamic models and data, (2) water quality models, and (3) geospatial models and systems. This work will develop the basis for model coupling and improve the spatial content of selected existing habitat and functional assessment models and method frameworks. As a result, a higher level of ecological response will be incorporated in these models and improved ecological input in system-wide studies and assessments will be achieved.

Application: A representative series of readily available index models was selected spanning the gamut of species, community, and functional applicability, and their major ecological, physical and spatial components were extracted. Those components (e.g., hydrologic parameters such as flooding frequency, duration, timing and extent; water quality parameters such as dissolved oxygen, salinity, pH, water temperature and turbidity; and landscape level parameters such as core, edge, patch size, distribution and elevation and aspect) were then sorted by discipline and made available to other ongoing research efforts as a basis for two-way coupling of physical models with index models (e.g., two-way transfer of information from physical data and models to habitat models). Information on potential integration is provided for incorporation in future models.

Benefits: With the knowledge and two-way transfers of information between watershed models developed as a result of this research, resource planners and managers will be better able to develop index models to extract data from advanced technological models, and better utilize this information in a community and functional systems context. By coupling these models, technical interoperability within a collaborative framework can be guaranteed. Districts can expect to see higher levels of precision and accuracy in their model responses and will see a cost savings in the reduction of sampling time and efforts. The model building protocols developed under this research effort will directly tie into the U.S. Army Corps of Engineers model certification process, reducing the effort necessary to get models through the verification process and increasing their level of reliability and scientific acceptability.


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Future Capabilities: We propose to loosely couple index models with GSSHA (Gridded Surface-Subsurface Hydrologic Analysis) in a case study in the USACE Albuquerque District. Additionally, we will couple a series of species-based index models with GSSHA and SIAM (Sediment Impact Analysis Method) in a case study in the USACE St. Louis District. We are working with CRREL to beta test a visualization tool that automates the sampling of critical spatial data used in community and functional index models as well as developing a series of GIS-generated parameters that can be used to characterize basins and develop site selection criteria for ecosystem restoration. We are developing a visualization tool that automates the sampling of critical spatial data used in community and functional index models as well as developing a series of GIS-generated parameters that can be used to characterize basins and develop site selection criteria for ecosystem restoration.

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